

REMARKS

Applicant thanks Examiner Eggerding for his very careful and thorough examination of the application. Herein, the claims have been amended to incorporate limitations from dependent claims into independent claims, for clarity and consistency, and to respond to the Section 112 rejections of the Examiner. No new matter has been entered. Basis for the claims as now presented can be found in the set of claims originally filed.

Due to the nature of the claim amendments, to assist the Examiner's review a clean copy of the claims as now presented (with amendment markings removed) is enclosed herewith as a courtesy.

The Examiner has rejected several claims under 35 USC § 112, second paragraph as being indefinite. It is respectfully submitted that the claims as now presented overcome all of the Section 112 rejections.

The limitation from claim 3 regarding the structure of the carrier (which is clamped in the frame) together with the limitations of intervening claim 2 as previously pending have now been incorporated to claim 1. Claim 3 was rejected under 35 USC § 103(a) as being obvious over Hodos, Nigg, Ono and Matsuura all taken together. Prior claim 3 required (and pending claim 1 now requires), *inter alia*, the following features in combination:

- a carrier made of a dielectric material and having a conductive layer on one side;
- the carrier being clamped in a frame; and
- a substrate able to be secured over substantially its entire surface to the carrier, which is clamped in the frame.

As amended, claim 1 now also includes the following additional limitation, basis for which is found at paragraph [0019] of the patent application publication for this application:

- the carrier being adapted to be *removably* positioned adjacent the surface of a chuck electrode, so that the conductive layer on the carrier and the surface of the chuck electrode form two plates of a plate-type capacitor when they are positioned adjacently.

As amended, it is respectfully submitted that none of the cited references (or all of them taken together) fairly discloses or suggests the combination of features now present in claim 1.

Hodos is relied upon to teach a vacuum process installation having a frame capable of clamping in order to hold/transport a substrate. The Examiner recognized that Hodos does not disclose a clamped in carrier, and has relied upon Nigg to supply this teaching. Office action, p. 5. The Examiner further recognized that neither Hodos nor Nigg discloses a chuck electrode. The Examiner therefore has relied upon Ono to disclose a chuck electrode. Office action, p. 8. Finally, the Examiner further recognized that none of the above three references discloses a conductive layer on the carrier (which is clamped in the frame), and has relied on Matsuura for this teaching.

Hodos discloses a fixed clamping structure (annular clamp assembly 25) associated with a chuck 20 to hold a wafer 26 to the chuck during processing. Col. 4, lines 48-55. As will be appreciated from the description and the figures in Hodos, the clamp assembly 25 is not removable from the chuck, and is not provided as part of a separate frame that can be removed from the chuck. Nor does the clamp structure clamp a *carrier* for the wafer 26, but in fact it clamps the *wafer 26 directly*. To process a wafer 26, the wafer 26 is separately fed into the chamber 11 via transfer device 14 through a gate 13 in the chamber wall 12 (col. 3 line 66 to col. 4 line 4), and the wafer 26 is then clamped in place before processing. To remove the wafer from the chamber 11, for example to deliver it to a further processing station, it is necessary to remove it from the clamping structure. If further processing in a different station is to be performed, it will be necessary to re-clamp the wafer 26 in the new station resulting in repeated clamping-and-unclamping operations, which may damage the wafer.

Referring to Nigg, there is no structure disclosed to retain the wafer in the stackable frame carrier described in that reference. That carrier is designed so that numerous such carriers carrying respective wafers can be stacked so as to store a large number of wafers in a small amount of space while at the same time protecting the wafers from damage. It is true that Nigg makes reference to the carriers therein being used to support wafers during processing. However, if the carrier in Nigg were to support such a wafer in a processing station, a separate clamp would be required to secure the wafer (and now the stackable carrier) in place in the processing station. If Nigg's carrier were to be inserted into Hodos's chuck 20, then the clamp assembly 25 in Hodos must be adapted to accommodate the wafer *and* the stackable carrier from Nigg thereon. However, there is no suggestion to incorporate the clamping structure into the carrier from Nigg itself, or that such clamping structure should actually mechanically clamp a

carrier for a wafer and not the wafer itself as it does in Hodos. Nothing in either reference, or in the combination of the two, suggests the unique feature of clamping *a carrier* in a removable frame member that can be separately inserted into and removed from processing station(s). The novelty of the claimed invention is even more apparent when one considers the function the carrier serves; to provide a single surface on which the wafer can be continuously supported through multiple processing operations (and even storage), which carrier also forms part of an electrostatic chuck to electrostatically secure the wafer in place during processing in a processing station. Nothing from Hodos or Nigg suggests this unique combination, and Ono does not cure the deficiency.

Like Hodos, Ono discloses a stationary chuck for supporting a wafer during processing. Unlike Hodos, which uses mechanical clamps to secure the wafer, Ono uses an electrostatic chuck to retain the wafer with electrostatic forces. However, the wafer must still be manipulated and removed from the support surface in Ono and separately transferred to another support surface (or another chuck in another processing station) for either further processing or storage. There is no suggestion from Ono to provide a separate carrier for supporting a wafer, which carrier is clamped in a frame that is removable from the processing station. There certainly is no mention that one of the electrodes in the electrostatic chuck of Ono should be removed from the fixed installation disclosed therein and provided as a layer on a wafer carrier clamped in a removable frame.

Finally, Matsuura is totally irrelevant to the present invention. That reference is relied upon simply to disclose a conductive layer provided on a nonconductive layer. There is no hint from Matsuura to provide such a structure in or as a carrier that is clamped in a removable frame for supporting and retaining a wafer as part of an electrostatic chuck that the carrier will form in each processing station in conjunction with a chuck electrode. The portion of Matsuura cited by the Examiner refers to making circuit boards, not electrostatic chucks or any component of one.

In summary, the cited references do not fairly disclose or suggest the unique combination of features recited in claim 1, wherein a wafer itself is not to be clamped using mechanical clamps, but instead will be supported on a carrier that is clamped in a removable frame, which can be inserted separately into a processing station or into successive processing stations, and wherein the carrier has a conductive coating that cooperates with a chuck electrode in each such

processing station to form an electrostatic chuck to retain the wafer in place on the carrier during processing via electrostatic forces. In other words, the *combination* of a removable carrier/frame assembly and hybrid electrostatic chuck, wherein one electrode of the chuck is retained in the removable carrier/frame assembly and cooperates with a separate chuck electrode in the processing station when disposed adjacently therewith, is absent from the prior art. Nothing in the prior art suggests preparing such a combination from what is disclosed in the cited references, without the applicant's teachings in mind. Accordingly, it is respectfully submitted that claim 1 as now presented is patentable over the cited references.

Independent claims 15 and 20 as now presented are method claims that include substantially all of the limitations discussed above, which are believed to support the patentability of claim 1. Accordingly, claims 15 and 20 also are respectfully submitted to be patentable for at least the same reasons as above.

Independent claim 11 is directed to a frame structure comprising a frame and a clamped-in film carrier that is adapted to carry a substrate on its surface. The film carrier is made of a non-conductive dielectric material having a conductive layer disposed on a side thereof, and the frame is conductive in at least one region, with the carrier and the conductive region of the frame being in contact. As will be appreciated, such a frame/carrier structure is useful in the methods of the claims mentioned above. For reasons already given, it is respectfully submitted this structure is nowhere disclosed or suggested in any of the cited references. The only reference to disclose any structure that may be compared to a 'frame' is Nigg. In that reference, stackable carriers are provided to store a large number of wafers in a small amount of space. No clamping mechanism is provided to support a film carrier in the 'frame,' and there certainly is no conductive layer on any such film or on any other surface in Nigg. Matsuura provides no motivation to provide such a conductive surface, at least because there is nothing evident *from the prior art*, without considering the applicant's claims, to indicate what purpose such a conductive surface would serve. Nothing in the prior art suggests separating the electrodes of an electrostatic chuck into one that remains in the processing station (i.e. the "chuck electrode") and one that remains with a removable carrier (i.e. the "conductive layer") that accompanies that carrier on removal from the station, for example for insertion into a second or subsequent processing station. Accordingly, claim 11 is also respectfully submitted to be patentable over the cited art.

The remaining references applied by the Examiner but not discussed above, Nozawa and Chu, also do not make any of the above-mentioned claims obvious. Like Hodos and Ono, Nozawa discloses a stationary chuck. Also like Ono, the chuck in Nozawa is an electrostatic chuck. But there would have been no reason to modify Nozawa's chuck to remove one of the chuck electrodes therefrom to a separate and removable carrier (provided as a conductive coating thereon) that is clamped in a frame member that can be transferred into and out of the processing station. Regarding Chu, that reference is relied upon merely to disclose the feature of short-circuiting the chuck electrode to release the substrate. This feature by itself does not provide any motivation to provide the structure recited in any of claims 1, 11, 15 or 20.

All remaining claims not mentioned above are dependent claims, and are believed to be allowable by virtue of their dependence on an allowable base claim. Accordingly, all claims are now believed to be in condition for allowance and notice to that effect is respectfully requested.

On form PTOL-326 from the last Office action (paper No. 20070503) the Examiner indicated that "none" of the certified copies of the priority document have been received. Enclosed herewith is a copy of the Notice of Acceptance of Application Under 35 USC 371 and 37 CFR 1.495, which indicates that the priority documents for this application have been received by the USPTO. These would have been forwarded by the International Bureau, and should be available from the PCT Office within the USPTO, which should have forwarded them to the Examiner. The Examiner is respectfully requested to contact the PCT Office at the USPTO to request that it forward the necessary priority documents, and to indicate that they have been received in his next communication to the Applicant.

Also enclosed is a copy of Form PTO-1449 listing references cited by the Applicant, and which were considered by the Examiner. The form indicates the Examiner may not have considered the last reference in the U.S. Patent Documents section (at least the arrow does not extend to that reference). It is believed this was probably an oversight, and the Examiner is respectfully requested to initial the space next to the reference (U.S. Patent No. 6,238,160) and forward a copy of same with his next communication to Applicant.

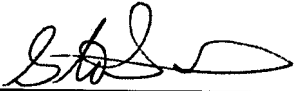
Should the Examiner have any questions or concerns regarding this submission or the arguments herein contained, he is requested to please contact the undersigned at the phone number provided below.

If there are any fees required by this communication that are not covered by an enclosed

check, please charge any such fees to our Deposit Account 16-0820, Order No. 38477.

Respectfully submitted,

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Date: August 28, 2007



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PRIORITY DATE

01/13/2003

CONFIRMATION NO. 9693

371 ACCEPTANCE LETTER



OC000000017952830

Date Mailed: 02/02/2006

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

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| <u>01/23/2006</u> | <u>01/23/2006</u> |
| DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS | DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS |

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363). Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 07/13/2005
- English Translation of the IA filed on 07/13/2005
- Copy of the International Search Report filed on 07/13/2005
- Preliminary Amendments filed on 07/13/2005
- Information Disclosure Statements filed on 07/13/2005
- Oath or Declaration filed on 01/23/2006
- U.S. Basic National Fees filed on 07/13/2005
- Priority Documents filed on 07/13/2005

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

ANITA D JOHNSON

Telephone: (703) 308-9140 EXT 226

PART 1 - ATTORNEY/APPLICANT COPY

FORM PCT/DO/EO/903 (371 Acceptance Notice)

JC20 Rec'd PCT/PTO 13 JUL 2005

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|---|--|----------------------------|----------------------|
| Form PTO-1449 | U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE | ATTY. DOC. NO. 38477 | SERIAL NO. 10/542075 |
| INFORMATION DISCLOSURE CITATION BY APPLICANT | | APPLICANT: Jürgen Weichart | |
| | | FILING DATE: | GROUP ART UNIT: |

U.S. PATENT DOCUMENTS

| Examiner Initial | | Document No. | Date | Name | Class | Subclass | Filing Date If Appropriate |
|------------------|---|--------------|---------|--------------|-------|----------|----------------------------|
| /MTE/ | A | 5,708,557A | 1/1998 | Dong et al. | | | |
| | B | 5,460,684 A | 10/1995 | Teuro et al. | | | |
| | C | 6,259,592 | 7/2001 | Masanori | | | |
| | D | 4,680,061 | 7/1987 | Lamont | | | |
| | E | 4,743,570 | 5/1988 | Lamont | | | |
| | F | 6,477,787 | 11/2002 | Morad et al. | | | ✓ |
| ↓ | G | 5,880,924 | 3/1999 | Kumar et al. | | | |
| | H | 6,238,160 B1 | 5/2001 | Hwang et al. | | | |
| | I | | | | | | |
| | J | | | | | | |

FOREIGN PATENT DOCUMENTS

| | | Document No. | Date | Country | Class | Subclass | Translation |
|-------|---|--------------|--------|---------|-------|----------|--------------|
| /MTE/ | L | 0 844 659 A | 5/1998 | EP | | | Cited in ISR |
| /MTE/ | M | 0 486 966 | 5/1992 | EP | | | Cited in ISR |
| | N | | | | | | |
| | Q | | | | | | |

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)

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| Examiner: /Matthew Eggerding/ | Date Considered 05/03/2007 |
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*Examiner: Initial if reference considered, regardless of whether citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.